

## VACUUM CLEANER HOSE ASSEMBLIES

This invention relates to vacuum cleaner hose assemblies of the kind including a flexible hose and a rigid cleaning wand attached at the forward end of the hose.

Vacuum cleaner hose assemblies can be of various different forms but generally they have one end that can be connected with a suction inlet on the vacuum cleaner and an opposite end that can be connected with a rigid wand by which the operative end of the assembly can be manoeuvred. A cleaning head can be connected to the remote end of the wand.

Attempts have been made to provide a hose that has a useful length for cleaning but which can be stowed in a relatively compact space. One way of achieving this is by making the hose extensible and retractable in length and by stowing a part at least of the length of the hose inside the cleaning wand. The hose could be of the stretch kind with a resilient reinforcing helix having a natural retracted length and covered by a flexible sleeve. The hose can be pulled to make it longer and, when released, returns to its natural retracted length. Stretch hoses are available with an extended/retracted ratio of up to about 7:1.

In such assemblies the end of the hose remote from the cleaner may be fixed in the wand close to its forward end or it may be slidable along the length of the wand, so that a part at least of the length of the hose can be stored in the wand.

One problem in using vacuum cleaner hoses is that the weight of the wand and hose makes it tiring to use for prolonged periods, especially if being used to clean elevated regions or if being used by weaker people. Where the hose is fixed at the forward end of the cleaning wand this problem is made worse because the weight of the wand is increased by the weight of the hose within it.

It is an object of the present invention to provide an alternative vacuum cleaner assembly.

According to one aspect of the present invention there is provided a vacuum cleaner hose assembly of the above-specified kind, characterised in that the wand extends rearwardly along a part of the length of the hose and that the wand has a section with an open wall structure by which the weight of the wand is reduced.

The wand may have two sections that can slide telescopically with one another such that the wand can have an extended length or a shorter, retracted length. The or each section of the wand preferably has one or two longitudinal struts between which are one or two windows. The hose is preferably retractable in length and a major part of the length of the hose may be stowable within the wand when not in use. The hose may be retracted in length by suction applied by a vacuum cleaner unit.

According to another aspect of the present invention there is provided a vacuum cleaner including a vacuum cleaner unit and a hose assembly according to the above one aspect of the invention.

A vacuum cleaner including a hose assembly according to the present invention, will now be described, by way of example, with reference to the accompanying drawings , in which:

Figure 1 is a side elevation view of the vacuum cleaner with the hose assembly in a retracted state;

Figure 2 is a side elevation view of a part of the hose assembly in an extended state;

Figure 3 is a cross-sectional view along the line III-III of Figure 2;

Figure 4 is a perspective view of a first different form of hose assembly;

Figure 5 is a perspective view of a second different form of hose assembly; and

Figure 6 is a perspective view of a third different form of hose assembly.

With reference to Figures 1 to 3, there is shown a conventional cylinder vacuum cleaner unit 1 with a suction inlet 2 and a hose assembly 3 having a coupling 4 connected with the inlet. The hose assembly 3 comprises a flexible hose 5, a rigid wand 6 and a short length of outer retaining tube 7.

The flexible hose 5 is preferably of the kind that has a natural extended length but which can be retracted to a shorter length by suction applied within the hose. Such hoses are described in WO 03/024294. The hose 5 is fixed at its rear end 50 with the coupling 4 and at its forward end 51 with a rotatable coupling 52 towards the forward end of the wand 6.

The wand 6 includes a coupling portion 60 to which a conventional cleaning head (not shown) can be connected. The coupling portion 60 includes a valve 61, which is normally open to allow flow of material into the section from its open end 62 and into the forward end 51 of the hose 5. The valve 61 can be closed to restrict flow into the hose 5 and thereby cause a reduced pressure when the vacuum cleaner is in operation, which applies an axial compressive force to the hose in the manner described in WO 03/024294. The hose 5 is retained in its retracted state during storage by the retaining tube 7, which is fixed at one end with the coupling 4 and can be attached at its other end with the rear end of the wand 6.

Attached with the coupling portion 60 is a forward telescopic section 64 that receives a rear telescopic section 65 around it, such that the two sections are slidable one within the other. These sections 64 and 65, however, differ from previous wands in that they have an open wall structure rather than being solid-wall tubes as in conventional wands. The sections 64 and 65 have a skeletal, frame-like structure with openings through which the hose 5 is visible. The telescopic sections may take various forms that provide a rigid structure at the forward end of the hose and enclose the hose sufficiently so that it extends along the portion. In the wand shown, the section 64 has two longitudinally-extending struts 66 and 67 of arcuate section and linked at their forward ends by the coupling portion 60 and at their rear ends by a ring 68. Between the struts 66 and 67 there are two open windows 70 and 71 on

opposite sides of the section 64 through which the hose 5 is exposed. Preferably the width of the windows 70 and 71 is slightly less than the diameter of the hose 5, so as to prevent it protruding through the windows. The forward section 64 is preferably moulded from a rigid plastics material but could be made from a lightweight metal, such as aluminium. The rear section 65 has a similar structure to that of the forward section 64 comprising two longitudinally-extending struts 72 and 73 linked at opposite ends by integral rings 74 and 75 and providing two opposite, elongate windows 76 and 77. A handle 78 is fixed with the rear section 65 towards its rear end. The inner diameter of the rear section 65 is substantially the same as the external diameter of the forward section 64 so that the forward section is slidable within the rear section. The ring 74 at the forward end of the rear section 65 and the ring 68 at the rear end of the forward section 64 are shaped to prevent the two sections being pulled apart, such as by means of an outwardly projecting lip around the ring 68 and an inwardly-projecting flange around the ring 74. The two sections 64 and 65 are arranged such that, in their position of maximum extension, there is still sufficient length of overlap of the two sections to ensure that together they form a relatively rigid structure. The two sections 64 and 65 may be arranged to lock releasably together when extended, such as by means of a snap fit or twist lock arrangement (not shown). The two sections could be provided with means for locking them together releasably at intermediate positions of extension.

Because the hose 5 connects directly with the coupling portion 60 at the forward end of the wand 6, it has been realized that the wand need not be enclosed in order to enable suction. The open structure of the wand 6 enables it to have a rigid character but enables it to be lighter than an equivalent solid-wall tube, thereby making the wand easier to use, especially for prolonged periods.

The wand could have various different constructions, such as shown in Figures 4 and 5. The hose assembly 3'' shown in Figure 4 has a wand 6' with two telescopic sections 64' and 65' but these each have only a single strut 66' and 73' respectively of arcuate section extending around the sections by between about 120° and 180°.

In the hose assembly 2'' of Figure 5, each section 64'' and 65'' of the wand 6'' is of semicylindrical shape having longitudinal struts 66'' and 73'' with edges 164'' and 165''

respectively, which interengage with one another in a slidable fashion. The rear section 65'' has a single ring 75'' at its rear end. When retracted, the two sections 64'' and 65'' together form a continuous wall tubular structure but, when extended, as shown in Figure 5, they provide two semicylindrical openings 70'' and 76'' on opposite sides and at opposite ends of the wand 6''.

The handle 78''' need not be fixed with the rear section 65''' but could be slidable rearwardly on a carriage 79''', as in the assembly 3''' shown in Figure 6, to enable the overall effective length of the wand 6''' to be extended.

It is not essential for the wand to be telescopic since it could have just one section. Alternatively, it could have three or more sections.

The invention is not confined to hoses of the kind that are retracted by suction but could be used with other retractable hoses, such as stretch hoses. Although the invention is primarily advantageous for retractable hoses there might be applications where it could be used with a conventional non-retractable hose.